ACTUATING STRUCTURE FOR ROTATION APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to a actuating structure for a rotation apparatus and, more particularly, to a rotation apparatus used for a heat dissipating fan or a water pump that can increase the rotation torque to optimize the rotation of the rotation apparatus.

Figures 1 and 2 shows a conventional heat dissipating fan used in an electronic apparatus. The heat dissipating fan 10a includes a hollow shell 1a, a round chamber 11a formed in the shell 1a, a connecting seat 12a formed at the bottom of the chamber 11a, a cap 13a protruding from the connecting seat 12a, and a coil 2a encircling the external surface of the cap 13a. The coil 2a is connected to a circuit board 21a and is fabricated by stacking a plurality of silicon steel sheets 22a together and winding the silicon steel sheets 22a with a coil 23a. The fan further comprises a fan 3a which has a hollow capping member 31a, in which a spindle 32 is installed. A permanent magnet 33a is formed on an interior edge of the capping member 31a, while a plurality of blades 34a are formed around the exterior surface of the capping member 31a.

During assembly, the coil 2a and the circuit board 21a are pulled over the cap 13a, such that the spindle 32a of the fan 3a is inserted through cap 13a, and the whole coil 2a is located within the capping member 31a of the fan 3a corresponding to the permanent magnet 33a. Inside the capping member 13a, the spindle 32a is engaged with the bearing 14a and the washer 15a, such that the bearing 14a is positioned by the spindle 32a and rotate along the same axis as the spindle 32a does.

Referring to Figure 2, the bearing 14a as mentioned above is located within the capping member 13a and is capped with the spindle 32a. Therefore, the capping member 13a must have proper dimension to accommodate the bearing 14a. Consequently, the area for installing the silicon steel sheets 22a capping around the capping member 13a is reduced. Therefore, how to increase the area for installing the silicon steel sheets 22a, so as to increase the rotation torque of the fan 3a within the specification of the fan 10a has become an important topic in the industry.

In addition, as the conventional fan includes a bearing within which spindle is rotating, lubricant has to be added to maintain fluent rotation. This causes inconvenience in application. However, without the lubricant, noise is likely to be generated.

Therefore, there exist inconvenience and drawbacks for practically application of the above conventional heat dissipating fan. There is thus a substantial need to provide an improved structure of a planar heat pip heat pipe that resolves the above drawbacks and can be used more conveniently and practically.

BRIEF SUMMARY OF THE INVENTION

The present invention provides an actuating structure for a rotation apparatus such as a fan or a pump. The actuating structure generates more rotation torque of the fan or pump, such that the rotation thereof is optimized.

The present invention also provides an actuating structure for a rotation apparatus such as a fan or a pump. The actuating structure reduces the friction area of the spindle, such that the lifetime is prolonged, the

performance is enhanced, no lubricate is required, and no problem associated with noise exists. The rotation apparatus is thus more convenient for use.

The present invention further provides an actuating structure for a rotation apparatus such as a fan or a pump. The stability of the rotation spindle is maintained to avoid displacement, wobbling and uneven abrasion of the spindle.

The actuating structure provided by the present invention comprises a spindle passing through a coil within a fan. By conducting electricity, a magnetic field is generated between the coil and a permanent magnet, such that the fan is driven to rotate. In this actuating structure, no bearing is installed between the spindle and the coil, while the spindle is fixed and rotatable along a common axis. Therefore, the area for installing the coil is increased, while the area of the silicon steel sheet is enlarged. The intensity of the magnetic field generated by the silicon steel is increased to increase the rotation torque of the fan, such that rotation of the fan can be optimized.

BRIEF DESCRIPTION OF THE DRAWINGS

These, as well as other features of the present invention, will become apparent upon reference to the drawings wherein:

Figure 1 shows an exploded view of a conventional heat dissipating fan;

Figure 2 shows a cross sectional view of a conventional heat dissipating fan;

Figure 3 shows an exploded view of a heat dissipating fan provided by the present invention;

Figure 4 shows the exterior feature of the heat dissipating fan;

Figure 5 shows a cross sectional view of an assembly of a heat dissipating fan; and

Figure 6 shows a cross sectional view of an assembly of a water pump.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides an actuating structure for a rotation apparatus. The application of such structure is not limited to the heat dissipating fan, but also includes other apparatus such as a water pump. Referring to Figures 3 and 4, a heat dissipating fan 10 used in an electronic device is illustrated. The heat dissipating fan 10 includes a hollow shell 1, a round chamber 11 formed in the shell 11, a connecting seat 12 formed at the bottom of the chamber 11, and a pressing cavity 13 formed at the center of the connecting seat 12.

The heat dissipating fan 10 further comprises a coil 2 connected to a circuit board 21. The coil 2 is formed by stacking a plurality of silicon steel sheets 22 and winding the stack of silicon steel sheets 22 with a coil 23. The heat dissipating fan 10 also comprises a fan 3 which includes a hollow capping member 31, a spindle 32 along the central axis of the capping member 31, a circular permanent magnet 33 (Figure 5) installed within the capping member 31, and a plurality of blades 34 extending radially from an external surface of the capping member 31. The spindle 32 has both ends protrudes outside of the capping member 31. A lid 4 is further installed at the top of the shell 1. A snapping hole 41 is formed at the center of the exterior surface of the lid 4.

Referring to Figures 3 and 5, during assembly, the coil 2 and the circuit board 21 are installed on the connecting seat 12 of the shell 1. The fan 3 is then installed in the shell 1 with one side of the spindle 32 thereof passing through the coil 2 and fixed in the snapping hole 13 of the bottom surface of the shell 1. After installing the fan 3, the coil 2 is located within the capping member 31 of the fan 3 and facing the permanent magnet 33. The lid 4 is then placed on the shell 1 with the top end of the spindle 32 rotatably pressed into the snapping hole 41 of the lid 4, and the bottom end of the spindle 32 pressed into the snapping hole 13 of the shell 1. Thereby, the spindle is positioned and rotatable along the same axis. The heat dissipating fan 10 is thus assembled as shown in Figure 4.

In operation, electricity is conducted, and magnetization between the coil 2 and the silicon steel sheets 22 is generated to cause rotation of the fan 3, so as to achieve heat dissipation.

Referring to Figure 5, in the present invention, no bearing is required in the heat dissipating fan. Therefore, the area for installing the coil 2 is increased; and consequently, the area of the silicon steel sheets 22 is enlarged. The magnet generated by the silicon steel sheets 22 is thus increased. As a result, under the same specification of the heat dissipation fan 10, rotation torque of the fan 3 is increased, and the rotation thereof is optimized.

In addition, as two ends of the spindle 32 are fixed in the snapping holes 13 and 41, friction area is thus reduced to lengthen the lifetime and enhance the performance thereof. In this design, no lubricate is required, while the noise problem does not exist. Further, as two ends of the spindle 32 are used as the supporting parts for rotation, the stability of the rotation

is maintained, such that the spindle will not displace or wobble to cause uneven abrasion.

Referring to Figure 6, a cross sectional view of an assembly of a water pump is illustrated. The rotation apparatus is applied to such water pump 20. The water pump 20 includes a hollow body 6 with a water inlet 61 at the bottom surface of the hollow body 6 and a water outlet 62 at a side wall near the bottom surface. A permanent magnet 63 is installed in hollow body 6. The permanent magnet 63 is wound by a coil 64. Underneath the permanent magnet 63, a blade 65 is installed.

A spindle 66 is installed to connect the permanent magnet 63 and the blade 65. The spindle 66 can be fixed with the blade 65 by direct implantation injection. Two ends of the spindle 66 are pressed against the upper seat 67 and the lower seat 68. The upper seat 67 includes a venting hole 671, such that the spindle 66 can be positioned and rotate along the same axis without the requirement of bearing.

When the water pump 20 is operating, the electricity is conducted and the coil 64 is magnetized by the permanent magnet 63 to drive the blade 65 to rotate, such that water is discharged from the water outlet.

This disclosure provides exemplary embodiments of an actuating structure for a rotation apparatus. The scope of this disclosure is not limited by these exemplary embodiments. Numerous variations, whether explicitly provided for by the specification or implied by the specification, such as variations in shape, structure, dimension, type of material or manufacturing process may be implemented by one of skill in the art in view of this disclosure.